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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/779,787	02/18/2004	Yu-Wen Chen	CHEN3640/EM	9841
23364	7590	04/05/2005	EXAMINER	
BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			SOWARD, IDA M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

10/779,787

Applicant(s)

CHEN ET AL.

Examiner

Ida M. Soward

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 February 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the application filed February 18, 2004.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Oath/Declaration

It does not identify the foreign application for patent or inventor's certificate on which priority is claimed pursuant to 37 CFR 1.55, and any foreign application having a filing date before that of the application on which priority is claimed, by specifying the application number, country, day, month and year of its filing.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:

1. **160** in Figure 1 and
2. **230** in Figure 2.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures

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appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The abstract of the disclosure is objected to because "**comprises**" should have been **includes** on page 9, line 1. Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities: "**210**" should have been deleted on page 3, paragraph [0008].

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4-5, 7-10 and 12-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Akram et al. (5,898,224).

In regard to claim 1, Akram et al. teach a flip chip 402 (column 5, line 13) package 400, comprising: a carrier 416 having an upper surface 414 and a lower surface; a chip 402 having an active surface 406 (column 5, line 15) and a back surface 424, wherein the chip 402 is disposed above the upper surface 414 of the carrier 416; a plurality of bumps 410 mounted on the active surface 406 (column 5, line 15) and connecting the upper surface 414 of the carrier 416 and the active surface 406 (column 5, line 15) of the chip 402; a dam 428 disposed on the upper surface 414 of the carrier 416; and a heat spreader 422 (columns 3-4, lines 63-67 and 1-3, respectively) attached onto the dam 428 and the active surface 406 (column 5, line 15) of the chip 402 (Figure 4, column 5, lines 11-45)).

In regard to claim 2, Akram et al. teach an adhesive layer interposed between the back surface of the chip 424 and the heat spreader 422 (column 4, lines 5-7).

In regard to claim 4, Akram et al. teach the dam 428 disposed at the periphery of the chip 402 (Figure 4).

In regard to claim 5, Akram et al. teach the dam 428 enclosing the chip 402 (Figure 4).

In regard to claim 7, Akram et al. teach an encapsulation 426 filled in a space enclosed by the heat spreader 422, the upper surface 414 of the carrier 416 and the dam 428 (Figure 4, column 5, line 26).

In regard to claim 8, Akram et al. teach the encapsulation 426 comprising an underfill (Figure 4, column 5, lines 30-31).

In regard to claim 9, Akram et al. teach the underfill 426 encloses the chip 402 and the bumps 410, and covers the upper surface 414 of the carrier 416 (Figure 4).

In regard to claim 10, Shim et al. teach the underfill 426 connected to the upper surface 414 of the carrier 416, the heat spreader 422 and the dam 426 (Figure 4).

In regard to claim 12, Akram et al. teach the material of a heat spreader 422 comprising aluminum (column 4, lines 1-2).

In regard to claim 13, Akram et al. teach the heat spreader 422 being a flat plate (Figure 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (5,898,224) as applied to claims 1-2, 4-5, 7-10 and 12-13 above, and further in view of Akram (US 2003/0011059 A1).

Akram et al. (5,898,224) teach all mentioned in the rejection above.

However, Akram et al. (5,898,224) fail to teach an adhesive layer being a thermally conductive epoxy; and the material of a heat spreader comprising copper.

Akram (US 2003/0011059 A1) teaches an adhesive layer being a thermally conductive epoxy (Figure 17, pages 6-7, paragraph [0060]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the flip chip package structure as taught by Akram et al. (5,898,224) with the flip chip package having an adhesive layer being a thermally conductive epoxy as taught by Akram (US 2003/0011059 A1) to provide a flip chip device with the ability to transfer heat from the semiconductor chip (pages 6-7, paragraph [0060]).

Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (5,898,224) as applied to claims 1-2, 4-5, 7-10 and 12-13 above, and further in view of Pu et al. (US 6,459,144 B1).

Akram et al. teach all mentioned in the rejection above.

However, Akram et al. fail to teach a dam being a formed in a ring-type and being an adhesive.

In regard to claim 6, Pu et al. teach the dam 203 being a formed in a ring-type (Figure 5A).

In regard to claim 15, Pu et al. teach the dam 203 being an adhesive (Figure 4, column 3, line 52).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the flip chip package structure as taught by Akram et al. with the flip chip package having a dam being a formed in a ring-type and being an adhesive as taught by Pu et al. to counteract the excessive thermal stress of the carrier (column 4, lines 59-60).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (5,898,224) as applied to claims 1-2, 4-5, 7-10 and 12-13 above, and further in view of Tung et al. (US 2002/0144775 A1).

Akram et al. teach all mentioned in the rejection above.

However, Akram et al. fail to teach the material of the heat spreader comprising copper.

Tung et al. teach the material of a heat spreader 6 comprising copper (Figure 3, page 3, paragraph [0026]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the flip chip package structure as taught by Akram et al. with the flip chip package having the material of a heat spreader comprising copper as taught by Tung et al. to provide a flip chip package structure with a thermally conductive heat spreader to have excellent heat dissipation characteristics (pages 2 and 3, paragraphs [0012] and [0026], respectively).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (5,898,224) as applied to claims 1-2, 4-5, 7-10 and 12-13 above, and further in view of Caletka et al. (US 2003/0034569 A1).

Akram et al. teach all mentioned in the rejection above.

However, Akram et al. fail to teach a plurality of solder balls formed on the lower surface of the carrier.

Caletka et al. teach a plurality of solder balls formed on the lower surface of the carrier 16 (Figure 1, page 2, paragraph [0029]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the flip chip package structure as taught by Akram et al. with the flip chip package having a plurality of solder balls formed on the lower surface of the carrier as taught by Caletka et al. to provide a flip chip package the utilizes conventional assembly techniques to economically mass product the package (page 1, paragraph [0008]).

Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (5,898,224) as applied to claims 1-2, 4-5, 7-10 and 12-13 above, and further in view of Wensel (5,989,941).

Akram et al. teach all mentioned in the rejection above.

However, Akram et al. fail to teach the material of a dam comprising thermally conductive epoxy.

In regard to claim 16, Wensel teaches the material of a dam 18a comprising epoxy (Figure 6, column 3, lines 27-34).

In regard to claim 17, Wensel teaches the material of a dam 18a comprising thermally conductive epoxy (Figure 6, column 3, lines 27-34).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the chip package structure as taught by Akram et al. with the chip package structure having the material of a dam comprising

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thermally conductive epoxy as taught by Wensel to enhance heat dissipation (column 1, lines 37-41).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Honda (US 2003/0137057 A1)

Johnson (US 2002/0140108 A1)

Kutlu (US 6,472,762 A1)

Lee et al. (US 6,351,032 B1)

Mertol (5,866,943)

Mertol et al. (6,114,761)

Murayama et al. (US 6,713,863 B2)

Shim (US 2003/0030140 A1)

Shim et al. (US 6,534,859 B1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M. Soward whose telephone number is 571-272-1845. The examiner can normally be reached on Monday - Thursday 6:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IMS
March 29, 2005

John M. Seward
A.U. 2822